

SUPPORT FOR THE AMENDMENT

This Amendment cancels Claims 15-16 and 19-20; amends Claims 5 and 7; and adds new Claims 27-30. Support for the amendments is found in the specification and claims as originally filed. In particular, support for Claims 5 and 7 is found in canceled Claims 15-16 and 19-20. Support for new Claims 27-30 is found in Claims 5 and 7-9 and in the specification at least at page 5, Table 1, No. 9 ("92" GPa). No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 5, 7-9 and 11-14, 17-18 and 21-30 will be pending in this application. Claims 5, 7, 8 and 9 are independent.

REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

The present invention provides an aluminum alloy for casting members for which high rigidity and a low linear thermal expansion coefficient are required, such as ladder frames and cases for automobiles. The absence of Mg, in the combinations of other elements featured in independent Claims 5 and 7-9, results in an "aluminum alloy having a Young's modulus of 90 GPa or more and a coefficient of linear thermal expansion of  $18 \times 10^{-6}/^{\circ}\text{C}$  or less".

Claims 5, 7 and 11-12 are rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 4,919,736 ("Nishi"). Claims 11-12 depend from independent Claims 5 and 7, respectively. Nishi discloses an aluminum alloy, containing 0.5 wt% or less Ni, for abrasion resistant die castings. Nishi at abstract. However, Nishi fails to suggest the limitation of independent Claims 5 and 7 of "1-6% by mass of nickel". Thus, the rejection over Nishi should be withdrawn.

Claims 5, 7-9 and 11-26 are rejected under 35 U.S.C. § 103(a) over JP 2000-204428A ("Horikawa"). Horikawa discloses an Al alloy die cast piston that excels in fatigue strength at high temperature and antiwear quality. Horikawa at English-language abstract. Horikawa discloses that the Al alloy piston contains 0.2 to 1.0 wt% Mn. Horikawa at English-language abstract. Horikawa discloses that the Al alloy piston contains 0.5-2.0 wt% Mg to raise mechanical strength. English-language machine translation of Horikawa at [0010].

However, Horikawa fails to suggest the "consisting of" limitation of independent Claims 5 and 7-9, which excludes the "0.5-2.0 wt.% Mg" required by Horikawa.

The Office Action asserts:

With respect to the language "consisting of" and the 0.5 to 2.0 weight percent magnesium as disclosed by Horikawa et al. (JP '428), the Examiner notes that Horikawa et al. (JP '428) disclose that 0.5 to 2.0 weight percent magnesium present in the aluminum alloy would remarkably improve mechanical strength [0010]. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to omit the 0.5 to 2.0 weight percent magnesium where remarkable mechanical strength would not be required or desired. MPEP 2144.04(II) and 2123(II). Office Action at page 7, lines 8-14.

On the contrary, the applied English-language **machine translation** of Horikawa discloses at [0010]:

[0010] Hereafter, **the component of the aluminium alloy used by this invention**, a content, manufacture conditions, etc. **are explained**.  
**Si:** It is the alloy content which crystallizes as a primary phase Si 11 to 16% of the weight, and improves thermal resistance and abrasion resistance. Moreover, it is a component effective also when reducing coefficient of thermal expansion with Eutectic Si and improving the fluidity at the time of casting. Furthermore, by aging treatment, it deposits as Mg<sub>2</sub>Si and mechanical strength is raised. Such effectiveness becomes remarkable with 11% of the weight or more of Si content. However, if Si of the excessive amount exceeding 16 % of the weight is contained, it will become easy to generate the big and rough primary phase Si leading to fatigue breaking. Moreover, it will be necessary to make casting temperature into an elevated temperature 730 degrees C or more.  
**Mg:** Deposit as Mg<sub>2</sub>Si by aging treatment **0.5 to 2.0% of the weight**, and it is the alloy content which raises mechanical strength, and the addition effectiveness of Mg becomes remarkable at 0.5 % of the weight or more.

However, if Mg content exceeds 2.0 % of the weight, at the time of casting, big and rough Mg<sub>2</sub> Si will crystallize and fatigue strength will deteriorate. On the other hand, **in less than 0.5% of the weight of Mg content, there are few amounts of deposits of Mg<sub>2</sub> Si by aging treatment, and reinforcement runs short.** English-language **machine translation of Horikawa discloses at [0010]** (emphasis added).

Because Horikawa discloses that "0.5-2.0 wt.% Mg" is an essential component of Horikawa's Al alloy, and Horikawa teaches away from less than 0.5 wt% Mg, there is no suggestion or motivation to omit Mg from Horikawa's Al alloy.

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. MPEP 2143.01.V.

As noted above, the Office Action asserts:

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to omit the 0.5 to 2.0 weight percent magnesium **where remarkable mechanical strength would not be required or desired.** MPEP 2144.04(II) and 2123(II). Office Action at page 7, lines 1-14 (emphasis added).

Where is the suggestion that "remarkable mechanical strength would not be required or desired" so that Mg could be omitted? Not in Horikawa, where at least 0.5 wt.% Mg is required for mechanical strength.

The Office Action relies upon impermissible hindsight reasoning.

Any judgement on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made and **does not include knowledge gleaned only from applicant's disclosure**, such a reconstruction is proper. MPEP 2144.X.A (emphasis added).

The exclusion of Mg from the aluminum alloys of independent Claims 5 and 7-9 is knowledge "gleaned only from applicant's disclosure", and not from Horikawa or the other cited prior art. Thus, the Office Action assertion that "it would have been obvious ... to omit the 0.5 to 2.0 weight percent magnesium" is based on impermissible hindsight reasoning and should be withdrawn.

As a result, Horikawa fails to suggest the "consisting of" limitation of independent Claims 5, 7, 8 and 9, which excludes the "0.5-2.0wt% Mg" required by Horikawa. Therefore, the rejection over Horikawa should be withdrawn.

Any *prima facie* case of obviousness based on Horikawa is rebutted by the significant improvement in both rigidity (Young's modulus of 90 GPa or more) and linear thermal expansion coefficient ( $18 \times 10^{-6}/^{\circ}\text{C}$  or less) that is achieved by the aluminum alloy of the present invention over the ranges of independent Claims 5 and 7 of "1-3% by mass of manganese" and "1-6% by mass of nickel"; and over the ranges of independent Claims 8 and 9 of "1-3% by mass of manganese" and "0.5-6% by mass of nickel", where "consisting of" excludes Mg. This is demonstrated in the attached Declaration Under 37 CFR 1.132 (where in response to the Office Action at page 16, lines 8-10, and page 17, lines 8-10, the standards of "Poor", "Good" and "Excellent" from the Declaration Under 37 CFR 1.132 filed May 26, 2009, are replaced with numerical values).

The attached Declaration Under 37 CFR 1.132 at Table 2 shows that both high rigidity (Young's modulus of 90 GPa or more) and low linear thermal expansion coefficient ( $18 \times 10^{-6}/^{\circ}\text{C}$  or less) is achieved only when the aluminum alloy contains the featured ranges of "1-3% by mass of manganese" and "0.5-6% by mass of nickel", where "consisting of" excludes Mg. In contrast, when Mg is 0.3-1.5 mass%, coefficient of linear thermal expansion is more than the featured " $18 \times 10^{-6}/^{\circ}\text{C}$  or less" (Table 2 at Horikawa 1-4 and Comparative 1).

When Mg is 0 mass%, but Mn is 0.2 or 0.8 mass%, coefficient of linear thermal expansion is more than the featured "18x10<sup>-6</sup>/°C or less (Table 2 at Comparative 2-3).

Horikawa fails to suggest the improved combination of high rigidity (Young's modulus of 90 GPa or more) and low linear thermal expansion coefficient (18x10<sup>-6</sup>/°C or less) that is achieved in accordance with the present invention over the ranges of independent Claims 5 and 7 of "1-3% by mass of manganese" and "1-6% by mass of nickel"; and over the ranges of independent Claims 8 and 9 of "1-3% by mass of manganese" and "0.5-6% by mass of nickel", where "consisting of" excludes Mg.

Thus, any *prima facie* case of obviousness based on Horikawa is rebutted. For this additional reason, the rejection over Horikawa should be withdrawn.

Claims 11-14 and 17-18 are further patentably distinguishable over Horikawa. As discussed above, Horikawa discloses that the Al alloy piston contains 0.2 to 1.0 wt% Mn. Horikawa at English-language abstract. Horikawa further discloses that "if Mn content exceeds 1.0% of the weight, Mn system crystallization object will become big and rough, and fatigue-at-elevated-temperature reinforcement will be reduced on the contrary". English-language machine translation of Horikawa at [0012]. Thus, Horikawa teaches away from a Mn content of, e.g., 1.1 wt% Mn, and fails to suggest the limitation of Claims 11-14 and 17-18 that "the amount of manganese is 1.2-3% by mass".

Applicants respectfully request that the Examiner acknowledge receipt of a certified copy of the priority document by initialing the appropriate boxes under section 12 on a Form PTOL-326.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.  
Norman F. Oblon

Customer Number

**22850**

Tel: (703) 413-3000  
Fax: (703) 413 -2220  
(OSMMN 06/04)

  
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Corwin P. Umbach, Ph.D.  
Registration No. 40,211

Attached: Declaration Under 37 CFR 1.132